

EXHIBIT A

(CLEAN VERSION)

AMENDMENTS TO THE SPECIFICATION

Amended paragraphs of the specification should read as follows:

On page 1, the Title and the first paragraph should read as follows:

a1

SELF GUYED STRUCTURES

This is the Utility, nonprovisional Patent Application related to Provisional Patent Application number 60/216,298, filed July 5, 2000, by Dennis J. Newland, hereby incorporated; this application claims benefit of priority of the provisional application.

Fig. 2A should replace Fig. 1A as the only figure to appear on the first page of any patent that may issue.

US Pat. Documents cited in paragraph 0009 of the instant application's publication (bottom of page 3 of the application as originally filed) should be referenced in a References Cited section that is to appear on the front page of any patent that may issue therefrom.

On page 2, the second and third paragraphs should read as follows:

a2

The tensile-integrity (or tensegrity) sphere was introduced by Fuller (1962) in U.S. Patent No. 3,063,521 as he used multiple modules of one variation of one embodiment of this invention e.g. a 3 discontinuous strut **HYPERBOLOID SELF-GUYED STRUCTURE (SGS)** with a circumferential configuration of guys to connect the strut ends in the "end-planes". At least one embodiment of this invention is an improvement of Fuller's in that it includes other guy configurations for the 3 discontinuous strut **HYPERBOLOID SGS** as well as including **HYPERBOLOID SGS's** of four or more struts, each with three guy

configurations and also including strut arrangements which intersect at an internal or a peripheral point as well as the discontinuous configuration.

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At least one embodiment of this invention is an improvement of these previous structures in that it may include additional guy configurations for these 6 and 3 strut **PLANAR SGS's** as well as maybe including 4,5 and 7 or more strut configurations, each with additional guy configurations and configurations where the strut planes are not necessarily orthogonal and configurations where struts intersect at an internal or a peripheral point as well as the discontinuous configuration.

On page 3, the first and second paragraphs should read as follows:

a3

Matan et al in U. S. Patent No. 5,688,604 (1997) and Jacobs in U.S. Patent No. 4,449,348 (1984) each devised structures composed of tension and compression members but in each case there was a twisting and/or a bending force on the compression members unlike at least one embodiment of this invention.

Much of the prior art has been limited to the configurations described above which have not enjoyed widespread use. At least one embodiment of this invention provides many additional configurations of the naturally material efficient structural design strategy of limiting structural elements to a purely compressional or a purely tensional load. By judicious choice of materials a wide range of strength, toughness, rigidity and/or flexibility and load response characteristics can be designed into these structures. By judicious combinations of **SGS's** either with other **SGS's** or with traditional structures, redundancy and failure tolerant designs can be achieved. Attractive and interesting as well as functional designs for applications where the structure will be visible are also advantages of this invention. At least one embodiment of these **SGS's** is pre-stressed and by varying this pre-stress load the designer can achieve differing structural characteristics (e.g. rigidity, resonance damping etc.) with the same structural elements. At least one embodiment of the **SGS's** can be made collapsible for ease of transportation or storage should collapsibility be a desirable feature of the structure being used.

On page 4, the first, second, third full paragraphs and fourth paragraph, which starts on page 4 and ends on page 5, should read as follows:

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This invention is, in at least one embodiment, an improvement of the prior art in that it includes new configurations of compression members or struts and tension members or guys to create new static structures having the ability to meet certain given design goals more economically and in more aesthetically pleasing arrangements. Embodiments of this invention provide many additional configurations of the naturally material efficient structural design strategy of limiting structural elements to a purely compressional or a purely tensional load.

This invention, **SELF-GUYED STRUCTURES (SGS's)**, is a series of three dimensional free standing static structures formed from a plurality of interconnected rigid compression members or struts and flexible tension members or guys (e.g. wire cables, chains or elastic cords). Each strut may be in pure compression (i.e. no bending or twisting forces) and each guy may be in pure tension. The struts are discontinuous in several variations and/or combinations of the embodiments of this invention, intersect at an internal or peripheral point in others, or radiate outwardly from an internal central point in still others. Embodiments (each with multiple variations) of this invention include; 1) **HYPERBOLOID SGS's**, 2) **PLANAR SGS's**, 3) **HYP-PAR SGS's**, 4) **RADIS SGS's**, and 5) **POLYGONAL SGS's**.

Different configurations of guy arrangement [are] may be claimed for each strut arrangement in [each] embodiments. The guys can be configured in a 1) circumferential, 2) radial or 3) in an internal arrangement in addition to the obvious 4) linear arrangement.

By judicious choice of materials a wide range of strength, toughness, rigidity and/or flexibility and load response characteristics can be designed into these structures. By judicious combinations of **SGS's** either with other **SGS's** or with traditional structures, redundancy and failure tolerant designs can be achieved. Attractive and interesting as well as functional designs for applications where the structure will be visible are also

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cont
advantages of this invention. These **SGS's** may be pre-stressed and by varying this pre-stress load the designer can achieve differing structural characteristics (e.g. rigidity, resonance damping etc.) with the same structural elements

On page 5, the first and second full paragraphs should read as follows:

a5
SGS's can be utilized as stand-alone modules or modules can be combined by connecting them at any point on a strut or guy in a nested, or an adjacently attached configuration to assemble composite **SGS's**. **SGS's** can similarly be combined with traditional structures to form additional composite structures.

At least some embodiments of **SGS's** can be made collapsible by utilizing a means of disconnecting the guys from the struts and/or utilizing a means to elongate selected guys or shortening selected struts.

On page 7, the second paragraph should read as follows:

a6
FIG. 4A is a 10 discontinuous strut **HYP-PAR SGS** with one of the three hyperbolic paraboloid surfaces having six struts and the other two having two each. This structure has a radial arrangement of guys between the edge struts of each of the three hyperbolic paraboloid surfaces (the ends of these edge struts form four "end planes" where the tetrahedron is truncated and the edge struts are also oriented in a **HYPERBOLOID** configuration with respect to each other) and a linear arrangement of guys between the struts of the single 6 and the two 2 strut hyperbolic paraboloid surfaces.

On page 9, the first, second, third and fourth paragraphs should read as follows:

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This invention is a series of three dimensional, free standing static structures titled **SELF-GUYED STRUCTURES (SGS's)**. They may be composed of a plurality of compression and tension members. The compression members or struts may be in pure compression (i.e. no bending or twisting forces) and the tension members or guys (e.g. wire cables, chains or elastic cords) may be in pure tension and have both ends attached

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to the structure itself, not an external anchor point. The struts are discontinuous in several variations and/or combinations of embodiments of this invention, intersect at an internal or peripheral point in others, or radiate outwardly from an internal central point in still others. Embodiments (described in more detail below) of this invention include: 1) **HYPERBOLOID SGS's**, 2) **PLANAR SGS's**, 3) **HYP-PAR SGS's**, 4) **RADIS SGS's**, and 5) **POLYGONAL SGS's**.

Different configurations of guy arrangement may be claimed for each strut arrangement in embodiments. The guys can be configured in a 1) circumferential, 2) radial or 3) internal arrangement (described in more detail below).

By judicious choice of materials a wide range of strength, toughness, rigidity and/or flexibility and load response characteristics can be designed into these structures. By judicious combinations of **SGS's** either with other **SGS's** or with traditional structures, redundancy and failure tolerant designs can be achieved. Attractive and interesting as well as functional designs for applications where the structure will be visible are also advantages of this invention. These **SGS's** may be pre-stressed and by varying this pre-stress load the designer can achieve differing structural characteristics (e.g. rigidity, resonance damping etc.) with the same structural elements

SGS's can be utilized as stand-alone modules or modules can be combined by connecting them at any point on a strut or guy in a nested, or an adjacently attached configuration to assemble composite **SGS's**. **SGS's** can similarly be combined with traditional structures to form additional composite structures.

On page 10, the first and second full paragraphs and the last paragraph, which begins on page 10 and ends on page 11, should read as follows:

ag At least some embodiments of these **SGS's** can be made collapsible by utilizing a means of disconnecting the guys from the struts and/or utilizing a means to elongate selected guys or shortening selected struts.

Several embodiments as well as multiple variations of each embodiment of these **SELF-GUYED STRUCTURES (SGS's)** are included in this invention.

- 1) At least one embodiment of the **HYPERBOLOID SGS's** may comprise three or more struts (labeled as 20 in **FIG. 1A, 2A, 2B, 2C and 2D**) arranged on the surface of a hyperboloid of revolution of one sheet. The struts are discontinuous in several variations of this embodiment and intersect at an internal or a peripheral point in other variations. The term discontinuous is used to mean the struts do not touch each other in the construction of the SGS and it means they do not intersect each other either internally or on the periphery of the SGS. The vertical guys (labeled as 30 in **FIG. 1A, 2A, 2B, 2C and 2D**) may lie on the surface of a separate hyperboloid of revolution of one sheet. These structures may be enantiomorphic in that struts and vertical guys can have a left handed or a right handed helicity. The lengths of the struts can be equal or of different length and although the length of each strut must span the mid-plane of the hyperboloid of revolution they need not have equal lengths on either side of the mid-plane. The roughly circular arrangement of strut ends on either side of the mid-plane form what are called "end-planes". In the simpler variations the strut ends/guy attachment points which define "end-planes" are indeed planes and are parallel to the mid-plane of the hyperboloid of revolution. In other variations the strut ends/guy attachment points need not form a true plane nor do they need to be parallel to the mid-plane. Non-parallel "end-planes" and/or non-equal length struts would allow design options for combinations of structures to exhibit a curvature. However the term "end-planes" will be used to label this part (connected by guys labeled 30a, 30b, 30c or 30d of **FIG. 1A, 2A, 2B, 2C and 2D**) of the **HYPERBOLOID SGS**. **FIG. 1A, 2A, 2B, 2C and 2D** are only four of the many possible variations of the **HYPERBOLOID SGS** embodiment

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cont.

claimed as a part of this invention. Additional guy configurations may be claimed for each variation of the **HYPERBOLOID SGS's** embodiment as described below.

On page 11, the first, second, and third full paragraphs, and the last paragraph, which begins on page 11 and ends on page 12, should read as follows:

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- 2) At least one embodiment of **PLANAR SGS's** may have a minimum of three struts defining a minimum of three planes (there can also be four or more planes) which intersect as necessary to form a three dimensional structure with integrity. These planes can be, but do not necessarily have to be, orthogonal to each other nor does each strut in a given plane need to be parallel to the other struts in the same plane. These struts are discontinuous in several variations of this embodiment and intersect at an internal or a peripheral point in other variations. **FIG's 3A and 3B** are only two of the many variations of the **PLANAR SGS** embodiment claimed as a part of this invention. Additional guy configurations may be claimed for each variation of the **PLANAR SGS's** embodiment as described below.

- 3) At least one embodiment of **HYP-PAR SGS's** may have struts which lie on a hyperbolic paraboloid surface. At least one embodiment of these **SGS's** has[ve] a minimum of four struts two in each of two hyperbolic paraboloid surfaces which intersect as necessary to form a three dimensional structure with integrity. These surfaces can be, but need not necessarily be, orthogonal to each other. Also there can be more than 2 hyperbolic paraboloid surfaces. The struts are discontinuous in several variations of this embodiment and intersect at an internal or a peripheral point in other variations. **FIG's 4A and 4B** are only two of the many variations of the **HYP-PAR SGS** embodiment claimed as a part of this invention. Additional guy configurations may be claimed for each variation of the **HYP-PAR SGS's** embodiment as described below.

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- 4) At least one embodiment of **RADIAL SGS's** has four or more struts arranged such that compressive forces are radially vectored from an internal central point . The inward strut ends may all connect at this internal central point. The internal central point need not be the exact center of the polygon but must be internal to the polygonal faces whose vertices are defined by the guy connections to the outward ends of the struts. **FIG's 5A and 5B** are only two of the many variations of the **RADIAL SGS** embodiment claimed by this invention. Additional guy configurations may be claimed for each of these **RADIAL SGS's** as described below.

On page 12, the first and second full paragraphs should read as follows:

a10

- 5) At least one embodiment of **POLYGONAL SGS's** has four or more struts arranged in a generally radial (but not precisely radial) configuration. The struts are discontinuous in several variations of this embodiment and intersect at an internal or a peripheral point in other variations. The outward ends of the struts may be connected by guys at points which are the vertices of a tetrahedron in **FIG 6A**, a cube in **FIG 6B** and an octahedron in **FIG 6C**. The inner strut ends may form a skewed quadrilateral in the tetrahedral version (**FIG 6A**), a rotated inner cube for the cubic version (**FIG 6B**), and a three sided twisted prism for the octahedral version (**FIG 6C**) of the illustrated **POLYGONAL SGS's** and other configurations for other polygons. The outer strut ends may be connected by guys such that an inward force is created and the inner strut ends are connected by guys resulting in an outward force which reacts the inward force resulting in structural integrity. **FIG's 6A, 6B, and 6C** are only three of the many variations of the **POLYGONAL SGS** embodiment claimed by this invention. Inner and outer guy configurations may be claimed for the **POLYGONAL SGS's** as described below.

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cont.

In addition to the obvious linear guy arrangement, guy configurations (and combinations of these arrangements) which are claimed for each of the above strut configurations may be as follows:

On page 13, the third full paragraph and the last paragraph, which begins on page 13 and ends on page 14, should read as follows:

all

SELF-GUYED STRUCTURES (SGS's) can be utilized as stand-alone modules or modules can be combined by connecting them at any point on a strut or guy in a nested, or an adjacently attached configuration to assemble composite **SGS's**. Parts of one **SGS** can be combined with parts of another (e.g. one plane of the 3 discontinuous strut **PLANAR** with two planes of the **HYP-PAR** as well as many other combinations). These **SGS's** can also be combined with traditional structures. In these combinations it is sometimes possible to have a strut and/or a guy that is common to one or more of the combined structures thus allowing the elimination of the extra member(s) and thereby economizing on the total number of separate structural members.

At least one embodiment of these **SGS's** structures can be made collapsible by a suitable means of disconnecting guys from struts and/or elongating selected guys or shortening selected struts. The degree of pre-stress used to construct at least some embodiments of **SGS's** can be varied to achieve certain design goals.

The Abstract should read as follows:

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ABSTRACT

A series of static structures formed from a plurality of interconnected rigid compression members or struts and flexible tension members or guys (e.g. wire cables, chains or elastic cords) is disclosed. The struts are discontinuous in several embodiments of the invention, intersect at an internal or peripheral point in others, or radiate outwardly from an internal central point in still others. Different configurations of guy arrangements may be described and claimed for each of the embodiments of this invention. Self Guyed Structures (SGS's) can be utilized as a stand-alone module or modules can be combined by connecting them at any point on a strut or guy in a nested, or an adjacently attached configuration to assemble composite SGS's.
